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PLANTS USED AS FISH POISONS

Sophie K. Nishimoto [1]/

In a "primitive" society, especially an insular one, there is a great dependency upon fishing as a means of obtaining food. Many different methods and instruments were used - from spears and nets to poisonous plants. The use of poisonous plants, however, is not well known throughout the whole Pacific region.

From Micronesia to Polynesia different kinds of plants were used in many different ways and for different reasons. The purpose of this paper is to present a comparative study of the different plants used, the reasons for their use, and some discussion of their effectiveness.

POLYNESIA

Hawaiian Islands:

In Hawaii the use of poisonous plants in fishing was frequently employed. The Hawaiian term for this method is hola. According to John F. G. Stokes (1921) two main plants were used - 1) the auhuhu (Tephrosia purpurea), 2) the akia (Wikstroemia spp.). This type of fishing was usually restricted to fresh water streams, rocky shores, tidal pools and reef regions.

The akia was pounded with stones and put into the water. According to the natives the "odor" from the fresh plant affects the fish. However, this "odor" dissipates quite rapidly, and therefore the plants must be used as quickly as possible. The bitter form of the Akia was used for fish poison.

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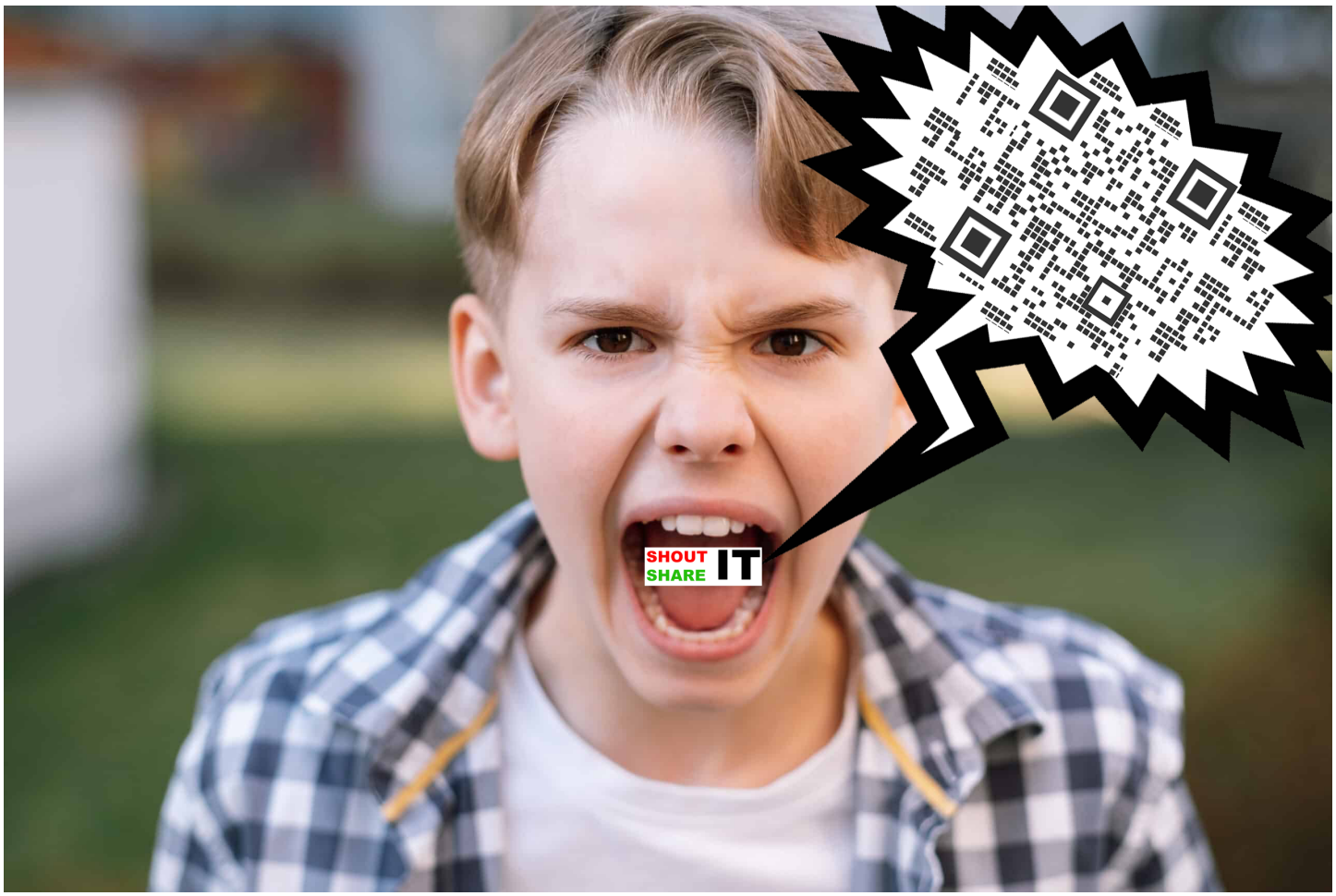
[1]/ The author is a University of Hawaii student who prepared this as a report for a class in Ethnobotany taught by Beatrice Krauss.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Two others, "mahalo" and "maoli", were two varieties used for medicinal purposes.

In the tidal pools, auhuhu and akia were usually enclosed in packages made from the sheath fiber of the coconut palm leaf stems. The bark of the auhuhu was normally used. It was reported that with both plants the only fish not greatly affected by the hola were the eels. While these plants have a poisonous effect upon the fish, man suffers no ill effects from eating the fishes' flesh.

W. F. Hillebrand (1888) suggested that the awa (Piper methysticum) was also used as a fish poison, but such use was not confirmed. However, later in this paper it is shown that this plant could be quite effective as a fish poison. In actuality the fish are not poisoned, but rather the plant acts as a narcotic. Stokes believes that perhaps Hillebrand had in mind the traditional custom of the natives in feeding awa to sharks to create their shark gods.

J. F. Rock (1913) add still another plant to the list - the anapanapa or kukuku (Colubrina asiatica). Little is known about the use of this plant and it is questionable whether the natives did use it as a fish poison.

The practice of using hola seems to have been abandoned in the Hawaiian Islands some years ago. This was due to both the lack of plants and the development of better means and methods of fishing. Now of course there are quite rigid laws as to the methods which can be used for fishing. The result is that most of the hola practices have been forgotten and lost.

Samoa:

In Samoa the main plant used is the futu (Barringtonia asiatica). The unripe, green seed kernels are used. They are crushed, then thrown into the water. This plant, however, was never recorded as being used by the Hawaiians, and it seems to be a fairly recent introduction to the Hawaiian Islands.

Another plant used is Tephrosia purpurea. This plant was crushed and mixed with taro, before being placed in the water.

Niue:

On this island the people used kava niu kini or lakau niukini, or tuha (Derris elliptica). This plant is poisonous to man and the fish must be cooked thoroughly before they are eaten. Fishermen also use the kohuhu or kohuhu tea (Tephrosia purpurea). Note the similarity of the Niue name to the Hawaiian name.

MELANESIA

Fiji:

Parham (1937) listed several plants used as fish poisons in Fiji. These include:

tuva - Pittosporum rhytidocarpum; duvakaloù, goligoli - P. arboreum;

vuturakaraka - Barringtonia asiatica; vuttic ni wai - B. racemosa; tuvakei - Tephrosia purpurea; duva gaga, duva mi viti - Derris trifoliata; duva ni niukini- D. malacensis; soto - Euphorbia norfolkii; vasa - E. neriifolia.

OTHER ISLANDS IN THE PACIFIC:

In Tahiti, Guam, Tonga and the Solomons, the use of only Barringtonia asiatica has been recorded.

On Ponape Stokes believes that Laminaria japonica, a seaweed, is used.

The Maoris, as far as has been recorded did not have the knowledge of using plants for fish poisons, although it is speculated that they may have used Pittosporum tenuifolium for this purpose. Merrill (1943) lists a variety of plants used for fish poisoning and their native names. However, he does not relate these names to the specific islands on which they are used.

After reading about the uses of plants as fish poisons, I decided to run experiments with three of the plants.

EXPERIMENT #1: awa - Piper methysticum

Four leaves of the awa were crushed by means of a mortar and pestle. Two fish (Tilapia) were placed in water and crushed awa was added. The first unit added did not appear to have any effect so a second unit was added. In approximately five minutes the fish began to swim erratically and rose to the surface "gasping" for air. At first, however, the fish were hard to catch but after awhile one could grab them easily with the hands.

Later the fish were placed in fresh water. They quickly revived and began swimming normally. This seems to indicate a narcotizing affect only, not a permanent poisoning. It suggest that the awa can be used for fishing if used in relatively large dosages. However, the plant was probably rarely used for 'poison' because it's use in ceremonies and for medicines was more important.

EXPERIMENT #2: futu - Barringtonia asiatica

The ripened fruit was cut in half longitudinally. First the husk was shredded and placed into a gallon jar with two Tilapia. The fishes were not affected. The seed was chopped and placed in a second jar with two Tilapia of the same size. The fish swam to the top 'gasping' for air, and died after ten minutes. Even though they were placed into fresh water they could not be revived.

This suggests that the seed of Baringtonia is quite effective as a fish poison. In some areas this plant is used when the fruit is green, but it is thought that it is more effective when ripe.

EXPERIMENT #3: akia - Wikstroemia sp.

Branches of akia were left in a jar of water for 48 hours. The leaves and stems were then crushed and placed into a jar containing four Tilapia. The fish were not affected. Others have shown that when the fresh plant was used (Stokes) the fishes did respond.

This indicates that the freshness of Wikstroemia is related to it's effectiveness as a fish poison. This would suggest that the plant must be available near the fishing site to be used most effectively.

Conclusion:

The plants used as fish poisons varied from Island group to Island group. It appears from the amount of information, that little careful research has been done, and perhaps many of the methods and plants which were used have been lost or forgotten. There are, however, some similarities between some of the Island groups, such as the use of Barringtonia asiatica.

It can also be suggested that there may be many plants which have not been recorded as fish poisons but which could have been so used. Perhaps the Pacific Islanders did make use of such plants, but these uses have not persisted to the present day.

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B O O K R E V I E W

Robert M. Warner

Ficus: the Exotic Species by Ira J. Condit, published by the University of California, Division of Agriculture Sciences. Copies may be obtained from: Agricultural Publications, University of California, Berkeley, California 94720. ($4.00)

Many species of the genus Ficus are widely distributed throughout the tropics and subtropics. The diversity of its members makes it one of the most interesting and challenging genus to the botanist, the horticulturist, and the home gardener alike.

A new book just off the press: Ficus: the Exotic Species by Dr. Ira J. Condit has answers to many of the questions about this genus which often are difficult to find. Problems of identification are answered with a key using the vegetative characteristics. Another key uses the fruit and flower characteristics. The book has numerous photographs, 35 plates of detailed drawings of twigs, leaves and fruit of many species. Detailed descriptions are given for 108 species, and notes on about 170 others are included.

One chapter discusses fruiting and growth habits and the dependence of the fig on tiny wasps for pollination. In Hawaii Ficus microcarpa produced no fertile seeds until the wasp Eupristina verticillata was introduced. Now with the help of the birds this tree has become a weed pest.

While traveling widely in pursuit of his Ficus studies, Dr. Condit visited Hawaii several times. Among his many notable publications are "The Fig," a book about Ficus carica, the edible fig: "Fig Varieties: a Monograph" and "Bibliography of the Fig." Presently is Professor Emeritus of the University of California at Riverside.

M A R I E N E A L M E M O R I A L P L A Q U E I N S T A L L E D

A plaque honoring the memory of Marie C. Neal has been placed at the entrance to the Herbarium on the fourth floor of Pauahi Hall. A gift of the Museum Board of Trustees, it was formally dedicated on January 20 in the presence of the Trustees, members of the staff, and friends of the late scientist. Miss Neal was botanist at Bishop Museum from 1930 until her death on June 6, 1965. She began her Museum career in 1920 as Malacologist.

Among the guests was Dr. Constance Hartt, formerly Senior Physiologist for the Hawaiian Sugar Planters' Association, who presented to the Museum a collection of Miss Neal's photographs and the personal copy of her book, In Gardens of Hawaii. Both Dr. Roland W. Force, Museum Director, and Dr. Frank

E. Midkiff, President of the Museum Board of Trustees, spoke warmly of Miss Neal and of her devotion and many contributions to science and to the Museum during the 45 years that she served Bishop Museum and the scientific community, and recorded the island plants.

Marie Neal is probably best known as the author of the encyclopedic guide that has been a Bible to gardeners and horticulturists and a Museum best seller for many years. In Gardens of Hawaii was first published in 1948, following by 20 years her successful earlier work, In Honolulu Gardens. In 1965 a new enlarged edition of the 1948 book, completely revised by the author, was published by Bishop Museum Press with a grant from the Juliette M. Atherton Trust. Unfortunately, she did not live to share in the enthusiastic welcome that the new edition received, although she had been presented with a specially bound advance copy only three weeks before her death. Through the generosity of Dr. Hartt, a long-time friend and companion, this copy is now in the Herbarium Library. Dr. Force expressed to her the Museum's deepest appreciation.

(This note is reprinted from the February 1969 edition of Ka'elele, the staff newsletter of the B. P. Bishop Museum. The Museum has recently announced the second printing of Miss Neal's book, In Gardens of Hawaii).

B O T A N I C A L S O C I E T Y N E W S N O T E S

Hawaiian Botanical Society Prize: The Hawaiian Botanical Society Award is presented each year to the graduating senior who has an outstanding academic record in the plant sciences and who shows promise of making significant contributions to the field of botany. The award this year was presented to Mr. Kenneth M. Sakamoto, of Honolulu, who is graduating from the University of Hawaii with a degree in Botany. Mr. Sakamoto, who intends to go on to graduate school next year, is especially interested in marine biology.

ANNUAL FORAY

The annual foray of the Hawaiian Botanical Society will be held on Friday, July 4. The leaders, Ernest G. Holt and Alex MacGregor, have arranged an interesting trip along the Mokuleia Trail in the Waianae Mountains. This trail passes through some of the finest ohia forest to be found on Oahu, and is an easy walk of about two and a half miles each way on a well marked, gently graded trail.

People wishing to attend should assemble at the HSPA Experiment Station, 1527 Keeaumoku Street, at 8 a.m. Bring lunch and water. Further information may be obtained from Mr. Holt (telephone 923-3259) or Mr. MacGregor (telephone 923-7122).

FIELD GUIDE FOR THE HAWAIIAN BOTANICAL SOCIETY FORAY - JULY 4, 1969

Charles H. Lamoureux

The trail selected for this foray is the western portion of the Mokuleia Trail (Trail No. 3 on the map "West Oahu Trails - 1968" issued by the Division of Forestry, Department of Lands and Natural Resources, State of Hawaii). Cars will be driven to Peacock Flat in the ahupua'a of Mokuleia on the northern slope of the Waianae Mountains, and left just outside the gate where the paved road enters the Forest Reserve at 1500 feet altitude. Just inside this gate a jeep road goes to the left from the paved road. This is the start of the Mokuleia Trail. For the first half-mile or so the road is passable to jeeps and similar vehicles. Beyond that point there is only a foot trail.

The jeep road portion of the trail passes across Peacock Flat through fairly open pasture land. Among the grasses present are Kikuyu grass (Pennisetum clandestinum), molasses grass (Melinis minutiflora), and Guinea grass (Panicum maximum). Herbs and small shrubs growing here include: honohono (Commelina diffusa); Spanish clover (Desmodium sp.), bitter herb (Centaurium umbellatum), Asiatic pennywort (Centella asiatica), Maui pamakani (Eupatorium adenophorum), thistle (Cirsium vulgare), poha (Physalis peruviana), lantana (Lantana camara), ha'uowi (Verbena litoralis), vervain (Stachytarpheta spp.), and morning glory or koali-'awahia (Ipomoea indica). Larger shrubs and trees which seem to be invading the pasture include Christmas berry (Schinus terebinthifolius), Java plum (Eugenia cuminii), mulberry (Morus sp.), eucalyptus (Eucalyptus spp.), koa haole (Leucaena leucocephala), huelo-'ilio (Buddleja asiatica), guava (Psidium guajava), and Norfolk pine (Araucaria excelsa).

After half a mile the jeep road forks. Take the right-hand or uphill fork, which soon disintegrates into a foot trail. The trail passes through a thicket of koa haole, Christmas berry, and huelo-'ilio, with a few plants of mamake (Pipturus sp.), alahe'e (Canthium odoratum), and olopua (Osmanthus sandwicensis). After a hundred yards or so the trail passes around the end of a more open ridge. Above the trail are trees of koa (Acacia koa), silk oak (Grevillea robusta), and Java plum. A bit further along a few small trees of 'ohi'a-lehua (Metrosideros collina subsp. polymorpha) can be found. Below the trail are trees of guava, silk oak, and alahe'e. The gold fern (Pityrogramma chrysophylla) occurs along the trail. About one hundred yards beyond this the trail enters a shady grove of koa and kukui (Aleurites moluccana) trees. There is an understory of olopua trees, and palapalai ferns (Microlepia sp.) form large patches in the shade. Near some large rocks above the trail are a few trees of a native hibiscus, and just beyond, to the right of the trail, is a tree of papala-kepau (Pisonia umbellifera).

The trail now passes through a thicket of guava and Christmas berry with some Maui pamakani, and after some fifty yards enters a forest of 'ohi'a-lehua.

For the next mile the trail traverses some of the finest 'ohi'a forest remaining on Oahu. Here, at the edge of the forest, the trees range from 30 to 50 feet in height. Further along the trail some trees may reach 70 feet or more. Smaller trees which occur with the 'ohi'a include papala-kepau, guava, alahe'e, papala (Charpentiera obovata), hame or haa (Antidesma platyphyllum), kopiko (Psychotria spp. - formerly known as Straussia), manono (Gouldia terminalis), and kolea (Myrsine lessertiana). A vine-like form of pilo (Coprosma sp.), and the maile (Alyxia olivaeformis) festoon the trees along with the bird's-nest fern (Asplenium nidus). A few hundred feet after entering the forest there is a small flat glade to the right of the trail. This glade is well worth exploring as in it can be found specimens of opuhe (Urera sandvicensis) and kaulu (Pteralyxia macrocarpa). The ground is covered with a dense growth of honohono (Commelina diffusa) and basket grass or honohono-maoli (Oplismenus hirtellus). Occasional plants of thimbleberry (Rubus rosaefolius) appear.

After continuing along the trail for another few hundred yards one can find a few lama (Diospyros ferrea) trees, and some particularly large 'ohi'a. One 'ohi'a in this area was estimated to be 70 feet tall and 2 feet dbh. An 'ahakea (Bobea sp.) tree here is 60 to 70 feet tall and 18 inches dbh. Nearby is a hame (Antidesma platyphyllum) tree some 60 feet tall and 14 inches dbh. Such trees appear to be much larger here than elsewhere on Oahu, but our present poor state of ecological knowledge of the area does not even permit us to speculate on the factors which promote such fine growth in these plants.

Among the smaller trees here are kopiko, alani (Pelea spp.), and 'ala'a (Pouteria sandwicensis - formerly known as Planchonella or Sideroxylon). Tree ferns (Cibotium spp.) are becoming more abundant, and the small okupukupu fern (Doodia kunthiana) can be found along the trail in company with the weedy Blechnum occidentale. 'Ie'ie vines (Freycinetia arborea) are fairly common.

A bit further along some different species are encountered. Among trees here are kalia (Elaeocarpus bifidus), 'ohi'a-ha (Eugenia sandwicensis), and po'ola (Claoxylon sandwicense). Shrubs of the ko'oko'olau (Bidens waianensis) are conspicuous with their yellow composite flowers. A few huehue vines (Cocculus ferrandianus) can be found. Two ferns which are fairly common are the pala'a (Sphenomeris chusana) and a species of Athyrium. Two species of hulumoa or Hawaiian mistletoe (Korthalsella spp.) occur as parasites on trees. One species has cylindrical stems, the other flattened stems.

After a short walk one arrives at an old cabin, which will provide a little shelter on a rainy day. The Mokuleia Trail continues on ahead for a few more miles, but it is recommended at this point that you turn right and follow the spur trail behind the cabin for a couple of hundred yards. This will bring you to the top of the summit ridge of the Waianae Mountains at 2250 feet altitude. From here there are superb views to the south and west into Makua Valley, and to the north where most of the north shore of Oahu is readily visible.

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THE HAWAIIAN BOTANICAL SOCIETY was founded in 1924 to "advance the science of Botany in all its applications, encourage research in Botany in all its phases," and "promote the welfare of its members and to develop the spirit of good fellowship and cooperation among them." "Any person interested in the plant life of the Hawaiian Islands is eligible for membership in this Society."

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